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Original Article

Improvement of the physical state of cadets from higher educational establishments in the Ukrainian armed forces due to the use of the kettlebell sport

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Abstract:
We studied the level and dynamics of indexes of the physical state of cadets who were involved in the kettlebell sport via an experimental program during their studies in a higher military educational establishment. Sixty nine cadets (18–20 years old) took part in the research. The sportsmen participated in either the experimental group (EG, n=32) or the control group (CG, n=37). We found that all explored indexes of the physical state of the cadets of the EG were better than the CG (P<0.05-0.001), which testifies to the efficiency of the experimental program.
Key words: physical state, cadet, kettlebell sport.

Introduction

The military-professional studying of cadets in modern higher military educational establishment (HMEE) takes place in the specific conditions, related to permanent growth of volume of educational information, high level of responsibility for the results of studying, high nervous-emotional tension, overload of intellectual sphere, low level of physical activity of cadets [2, 3]. It results to worsening of activity of the cardiorespiratory system, exchange processes; indexes of professionally important qualities; working capacity and physical state of cadets [3, 8].

Scientists found that firmness of organism to negative factors of educational activity, health level and professional longevity are effectively formed by means of systematic employments by physical training and sport [4, 5, 10]. Researches of many scientists testify that one of directions of improvement of physical training of cadets is: on junior courses – forming of base physical preparedness on the basis of overwhelming development of strength and endurance, on older courses – development and perfection of the special physical preparedness depending on the features of future professional activity [2, 6].

The effective facilities of physical training that can be instrumental in the decision of the problem of cadets on junior courses, the exercises of kettlebell sport can serve. The exercises of kettlebell sport have a lot of advantages: simplicity, availability, richness of content, low level of traumatism, simplicity of the material providing [1, 7, 9]. A plenty of participants of annual Ukrainian Armed Forces championships, conducting of reviews-competitions on the best organization of physical preparation and sport work with bringing 100 % of personnel, regular participation of servicemen in championships of Ukraine, Europe and world, inclusion of kettlebell sport to the regional and national sporting events testifies about high popularity of kettlebell sport among cadets of HMEE.

The results of the author's research [6, 7] show that training with kettlebells helps to reduce heart rate (HR) and stabilize blood pressure at rest. In the studies [8, 10] found that regular regular kettlebell lifting exercises contribute to the effective development of basic physical qualities, promoting a positive influence on the functional possibilities and physical development of young people.

Materials and methods

Sixty nine cadets of Zhytomyr Military Institute named after S. P. Koroliov have took part in the research. They have been included in experimental group (EG, n=32) and control group (CG, n=37). The explored groups were formed from the cadets of the first course aged 18-20: cadets, which in sport work hours went in for kettlebell sport, entered in EG; cadets, which got busy on the operating program with different parts of physical training, entered in CG. The initial indexes of physical state of cadets of EG and CG were certainly the same (P>0,05). Duration of pedagogical experiment – 2 years. The level and dynamics of indexes of physical state of cadets of EG and CG were checked up in every semester during 1 and 2 courses (4 stages of experiment).

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Research of physical state of cadets has been conducted after the indexes of physical development (height, weight, vital capacity (VC), dynamometry hand) and functional possibilities (heart rate, blood pressure, heart rate recovery time after dosed physical loading (20 squats for 30 seconds)). Also the index of physical state by the method of E.A. Pirogova and level of health by the method of G.L. Apanasenko were explored.

During the researches the authenticity of difference between the indexes of cadets of experimental and control groups by means of Stydent's criterion has been determined. The dynamics of indexes in each of groups has been also estimated.

The aim of the article is to explore the influence of trainings by kettlebell sport on the indexes of physical state of cadets of HMEE.

Tasks of article:

1. To explore the level and dynamics of indexes of physical development of cadets during the experiment.

2. To explore the level and dynamics of functional possibilities of cadets, which in sport work hours went in for kettlebell sport.

Research methods: theoretical analysis and generalization of scientific and methodical literature, pedagogical supervision, testing, pedagogical experiment, methods of mathematical statistics.

Results

Taking into account works of leading scientists [2–5] and results of our previous researches [6–10], we have developed the author program of improving of physical state of cadets of HMEE by means of kettlebell sport during studying on 1 and 2 courses. To create the functional «base» of cadets on junior courses for the rapid capture of professional skills and abilities on senior courses was the primary aim of the author program.

Task of the author program: to improve of physical development, functional possibilities and health of cadets on junior courses; to increase of level of general physical preparedness with accenting of attention on development of power and endurance; to increase of firmness of organism to action of unfavorable factors of studding; to form of motivation to employments by physical training and sport.

Analysis of indexes of height of cadets of EG and CG testifies that during the experiment a reliable difference is not fixed (P>0.05). The mean value of height of cadets of EG and CG does not certainly differ for all period of experiment (P>0.05) (tabl. 1).

Table 1. Dynamics of indexes of physical development of cadets of EG and CG in the process of the pedagogical experiment (X±m, n=69)

Stages	EG (n=32)	CG (n=37)	Stydent's criterion (t)
	Height (sм)		
1	177.66±0.88	177.14±0.93	0.46
2	177.85±0.99	177.31±0.91	0.40
3	177.94±0.98	177.46±0.89	0.36
4	177.97±0.97	177.59±0.87	0.29
(t 1-4)	0.26	0.35	
	Weight (kg)		
1	69.48±0.83	69.61±0.69	0.12
2	69.60±0.79	70.68±0.70	1.02
3	69.73±0.76	71.29±0.69	1.52
4	69.82±0.78	72.19±0.68	2.29
(t 1-4)	0.30	2.66	
	Vital capacity (ml)		
1	3895.00±36.39	3875.00±40.46	0.37
2	3962.00±32.72	3940.00±31.78	0.48
3	4017.50±30.79	3962.50±26.85	1.35
4	4057.50±26.89	3995.00±28.05	1.61
(t 1-4)	3.59	2.44	
	Dynamometry hand, kg		
1	40.96±0.89	41.07±0.67	0.10
2	43.46±0.62	41.88±0.58	1.86
3	44.60±0.51	42.55±0.59	2.63
4	45.74±0.46	42.71±0.57	4.14
(t 1-4)	4.77	1.86	

Researches of weight testify that this index in EG has certainly stable values during all period of experiment, the difference between weight of cadets of EG at the beginning and at the end of experiment makes 0.36 kg only (P>0.05). The weight of cadets of CG grows constantly during studding in HMEE: weight of cadets in 4 semester is certainly higher than at the beginning of experiment on 2.58 kg (P<0,05) (tabl. 1). Comparison analysis of indexes of EG and CG shows that at the end of experiment weight of cadets of CG is certainly higher than in EG on 2.37 kg (P<0,05) (fig. 1), that testifies to the positive influencing of employments by the author program to stabilization of weight of cadets, as the most important index of physical development.

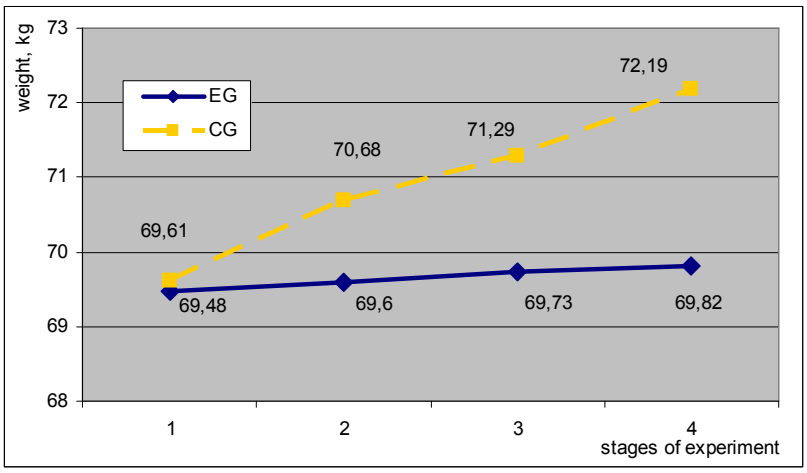

Fig. 1. The dynamics of indexes of weight of cadets of EG and CG in the process of the experiment (n=69, kg)

Research of vital capacity, which characterizes work of the respiratory system, testifies that during the experiment VC in EG and CG became certainly better (P<0.05), however the indexes of groups on all stages of experiment does not certainly differ (P>0.05). At the end of experiment VC in CG became better comparatively with basic data on 187.50 ml (R<0.05), and in EG – on 232.50 ml (P<0.001) (tabl. 1). The analysis of indexes of dynamometry hand showed that in 3–4 semesters the indexes of cadets of EG were certainly better, than in CG. At the end of the experiment difference makes 3.03 kg (P<0.001) (tabl. 1). During the experiment the indexes of dynamometry hand in EG grew on 4.76 kg (P<0.001), in CG – on 1.64 kg (P>0.05).

The analysis of functional possibilities of cadets by the indexes of heart rate testifies that in 1–3 semesters the indexes of cadets of EG and CG did not differ (P>0.05). In 4 semester the difference was reliable (P<0.01). For the period of experiment the indexes of heart rate of cadets of EG and CG become better, but in EG the difference between basic and eventual data was reliable (P<0.001), and in CG – unreliable (P>0.05). (tabl. 2). The analysis of systolic blood pressure testifies that indexes of cadets of EG and CG did not differ during the experiment (P>0.05), it remains stable in the process of experiment in both groups (tabl. 2).

The indexes of diastolic blood pressure of cadets of both groups did not have reliable difference also (P>0.05). But at the end of experiment the indexes of EG become certain better comparatively with basic data (P<0.05), and in CG – did not changed (P>0.05) (tabl. 2). The analysis of heart rate recovery time after dosed physical loading testifies that in 4 semester the difference between the indexes of EG and CG made 6.35 sec and was reliable (P<0.01) (tabl. 2). During the experiment heart rate recovery time in both groups become better (P<0.001).

The level of physical state is determined by the complex of factors among which the indexes of the cardiorespiratory system and weight are basic. For determination of level of physical state of cadets we explored index of physical state. It is set, that in 1 – 3 semesters index of physical state of cadets of EG and CG did not differ (P>0.05). At the end of experiment the difference made 0.012 cu and was reliable (P<0.01). The index of physical state of cadets of EG has a positive dynamics during the experiment: index of 4 semester is higher than 1 on 0.011 cu (P<0.05). The difference between index of cadets of CG at the beginning and the and of experiment is unreliable (P>0.05) (fig. 2).

The analysis of physical health showed that in 1 and 2 semesters the indexes of cadets of EG and CG did not differ (P>0.05). In 3 and 4 semesters the difference made 1.47 and 1.63 points and was reliable (P<0.001). For the period of experiment the level of physical health of cadets of both groups become better: in EG – on 2.17 points (P<0.001), and in CG – on 1.12 points (P<0.05) (fig. 3).

Table 2. Dynamics of functional possibilities of cadets of EG and CG in the process of the pedagogical experiment (X±m, n=69)

Stages	EG (n=32)	CG (n=37)	Stydent's criterion (t)
Heart rate (p/min)			
1	70.38±0.20	70.30±0.21	0.28
2	70.13±0.18	70.23±0.21	0.36
3	69.70±0.13	70.15±0.20	1.89
4	69.28±0.16	70.05±0.16	3.40
(t 1-4)	4.29	0.95	
Systolic blood pressure (mmHg)			
1	116.55±0.42	116.18±0.40	0.64
2	116.53±0.38	116.78±0.42	0.44
3	116.48±0.34	116.43±0.36	0.10
4	116.40±0.31	116.35±0.35	0.11
(t 1-4)	0.29	0.41	
Diastolic blood pressure (mmHg)			
1	71.25±0.39	71.18±0.52	0.11
2	70.80±0.45	70.90±0.39	0.17
3	70.38±0.41	70.88±0.38	0.89
4	69.95±0.34	70.83±0.38	1.73
(t 1-4)	2.51	0.54	
Heart rate recovery time after dosed physical loading (sec)			
1	139.35±2.47	138.78±2.07	0.18
2	134.10±1.97	135.03±1.92	0.34
3	125.23±1.44	129.03±1.59	1.77
4	116.85±1.41	123.20±1.29	3.32
(t 1-4)	7.91	6.39	

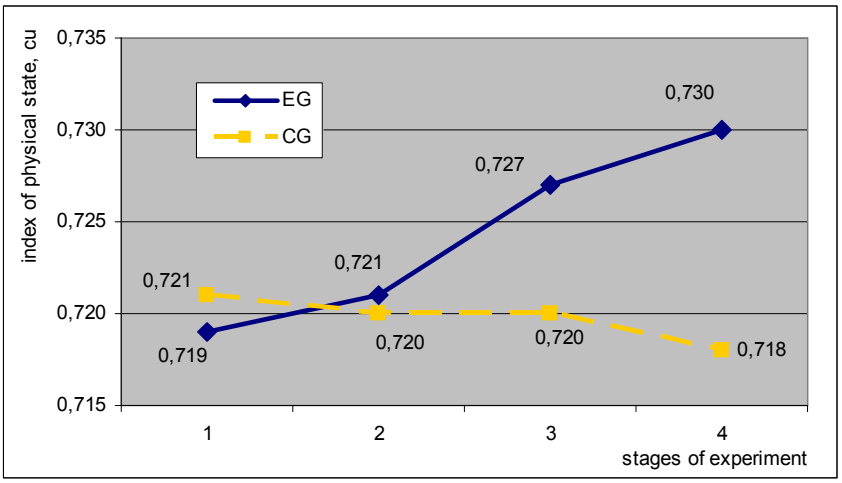

Fig. 2. The dynamics of index of physical state of cadets of EG and CG in the process of the experiment (n=69, cu)

Discussion

The analysis of results of pedagogical experiment testifies that training with kettlebells provides reliable stabilization of weight of cadets of EG, assist to development of power and endurance.

Research of dynamics of heart rate, blood pressure, VC, heart rate recovery time after dosed physical loading (20 squats for 30 seconds) testifies to the improvement of functional possibilities of the cardiorespiratory system of cadets of EG in the process of employments by kettlebell sport on junior courses. There is the decline of heart rate, blood pressure, increasing of reserve possibilities of the cardiorespiratory systems, decreasing of heart rate recovery time after dosed physical loading, perfecting of exchange processes. It testifies to advantage of the author program above the operating system of physical training in HMEE.

After results of research of index of physical state and physical health level it is exposed, that systematic employments by physical exercises allow to improve the physical health of cadets: physical health level of cadets of EG in 1–3 semesters is estimated as «below from middle», but in 4 semester – as «middle».

Physical health level of cadets of CG during the experiment is estimated as «below from middle». It is important to mark that at the beginning of experiment the most percent of cadets of both groups had «low» and «below from middle» physical health level. At the end of pedagogical experiment 72.5 % cadets of EG had «middle physical health level» and 27.5 % – «below from middle». Physical health level of 62.5% cadets of CG was appraised as «below from middle», 27.5 % – as «middle» and 10 % – as «low».

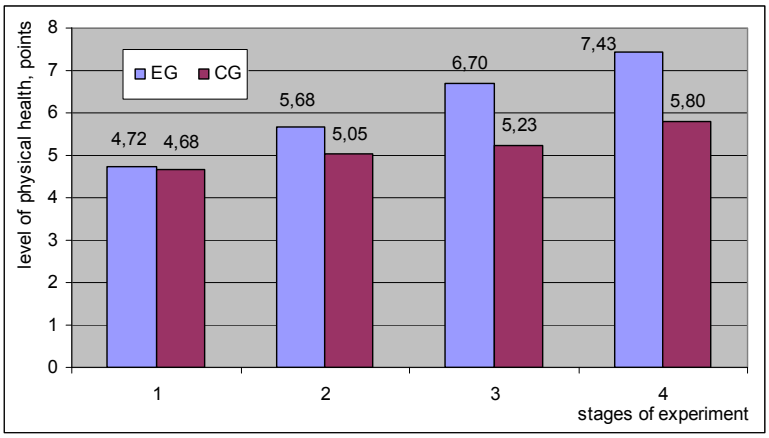

Fig. 3. The dynamics of physical health of cadets of EG and CG in the process of the experiment (n=69, points)

It is definite, that systematic employments by kettlebell sport positively affect physical development, functional possibilities and health level of cadets of HMEE. Thus, growth of level of physical state of cadets on junior courses thanks to systematic employments by kettlebell sport by the author program will create pre-conditions to effective development of the professional-applied qualities of cadets on senior years.

Conclusions

1. Verification of efficiency of the experimental program witnessed her more expressed positive influencing, comparatively with the operating program, on the improvement of indexes of physical development, functional possibilities and health of cadets of junior courses.

2. It is exposed, that at the end of experiment cadets of EG have certainly better (R<0.05–0.001), than in CG, indexes of weight – on 2.37 kg, dynamometry hand – on 3.03 kg, heart rate – on 0.77 p/min, heart rate recovery time – on 6.35 sec, index of physical state – on 0.012 cu, physical health – on 1.63 points.

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